

GMO Panel Discussion – 10/14/13

Ron Rosmann

Rosmann Family Farms

Harlan, Iowa

ronrosmann@gmail.com

Biotechnology is not the silver bullet proponents say it is. Nor is the whole story shared about problems and flaws of a science that does not take the necessary integrated approach to growing crops. One of the biggest problems is weed resistance due to the overuse of glyphosate, commonly known as Roundup™. An article in Science Magazine likened it to a heroin addict coming down from a twenty year high of being on glyphosate. (Science-Sept. 2013)

To date, the biotechnology industry has mostly focused on two pest management traits, herbicide tolerance and Bt-insect protected plants. Neither technology is designed to increase “genetic yield” potential. In fact, it is likely that the focus of plant breeders in the U.S. on these two traits over the last two decades has *slowed* progress in other areas of crop improvement that would have increased genetic yield potential. But, we will never know for sure now.

In my neighborhood and across the American Midwest, herbicide-tolerant and Bt-protected crops have made life simpler for conventional farmers. They did turn one of the most challenging and risky aspects of farming – pest management – into one of the easiest. The combination of simplicity and effectiveness drove extremely rapid adoption, and big increases in seed-biotechnology industry sales and profits.

But too much of a good thing on a farm can reverse itself. The companies for which Drs. Chilton and Fraley (2013 prize recipients) work for deserve credit for the development of the technology behind this year’s World Food Prize, but these companies are also responsible for how the technology has been promoted and marketed, and to a large extent, how it has been used on the farm.

We are drowning in a sea of glyphosate, especially in states like Iowa. The industry needs to acknowledge that the benefits of GMO crops have often been overstated. They are not the silver bullet that proponents claim, and if used incorrectly, or if relied on too heavily, they don’t work very well, or begin to create new problems worse than the initial ones designed to address.

The seed and bio-technology industry claims that pesticide use has decreased significantly because of the use of Biotechnology and that claim is made in this year’s “Statement of Accomplishments” for the World Food Prize. This claim was also made by the President of Iowa State University, Steven Leath and two other university presidents in an editorial in the Des Moines Register (October 9, 2013). Unfortunately, that statement is not true, at least here in the U.S. The question that follows is whether or not the seed, chemical and biotechnology monopolies are able to exert too much influence on public institutions like Iowa State. As public funds for research have largely dried up, funding by private corporations has risen dramatically over my farming career. Possible bias can naturally filter in. Farmers, scientists or anyone

wanting to conduct independent research on bio-tech products are prohibited from doing so. (Scientific American-2009)

The industry is doing its best to downplay the resistance of glyphosate. The most up-to-date, peer reviewed study on trends in pesticide use on GMO crops was done by Chuck Benbrook, of the Center for Sustainable Agriculture and Natural Resources, Washington State University. (Benbrook-2012) Benbrook is a past director of the Board on Agriculture of the National Academy of Sciences and his study relies on publicly available USDA data and calculated the net impact of herbicide-tolerant and Bt-protected crops in the U.S. on overall pesticide use from 1996-2011. There has been a total 527 million lbs. increase in herbicide use on GMO crops between the years of 1996-2011, due mostly to weed resistance. Bt crops have reduced insecticide use by about 123 million pounds in this same time period, resulting in an overall 400 million pound increase in pesticide use as a result of the planting of GMO crops.

Research from twenty years of glyphosate usage is now showing that it interferes with nutrient uptake, upsetting the soil microbial community, physiologically weakening the plant and making it more susceptible to diseases. In fact, in 2010, 11% of all corn grown in this country was sprayed with fungicides. From the 1960's clear to 2005, less than 1% of all corn grown received fungicides annually. I

I want to speak tonight on behalf of all farmers, not just organic producers. A whole generation of farmers became accustomed to the easy farming of just monoculture corn and soybeans with the use of glyphosate and Bt. It appears this is coming to a screeching halt. It is currently worse in the southeastern U.S. but the resistance problem is rapidly moving to the corn-belt. In Tennessee last year, soybean farmers lost \$120 million dollars because of the need for more spraying and lower yields. Larry Steckel, University of Tennessee, estimates Iowa soybean farmers stand to lose over 700 million dollars annually in the future because of the weed resistance issue (Steckel-2012) (I might also point out that no new herbicide or mode of action has been developed in 20 years).

When a conventional farmer orders GMO corn seed for next year, he or she cannot say "...and please hold the RR (Roundup Ready) trait..." Since about 90% of the corn seed on the market next year will have the RR trait, only some 10% of the land planted to corn – including some of mine – will be sown to seed not containing the RR gene. Most farmers wanting to reduce their reliance on glyphosate won't have the option of doing so, because the trait will be in essentially the entire conventional corn, soybean, and cotton seed supply.

This means that even more glyphosate, and greater volumes of other, older and riskier herbicides are going to be used in an effort to combat glyphosate-resistant weeds. In order to make it possible for GMO farmers to spray additional, older herbicides during the growing season, the biotechnology industry is pushing hard to market as yet unapproved-GMO varieties with herbicide-tolerance to multiple herbicides, including older products like 2,4-D and Dicamba reformulated to have supposedly 90% less drift than older formulations.

I am trying to inform my fellow farmers and you the public that the mono-culture of corn and soybeans with these gene insertions has made us very vulnerable to many difficulties. We simply must have more crop diversity and a scientific based agro-ecological approach not just to weeds and pests but for all of agriculture. I have 30 years of documentation from our Shelby County farm that low-cost, renewable and regenerative farming practices work. We get comparable yields through the use of legumes, cover crops, and growing many different crops,

not just two. We have 90 stock cows and 40 sows and sell organic beef and pork. We rely on the ecosystem services that nature provides and this keeps more resources and profit on the farm instead of in the hands of the agricultural input industry. We have not purchased any nitrogen in over 30 years, but instead rely on our own composted manure and legumes for our nitrogen fertility. Our diversified 700-acre crop and livestock farm is a model that respected people like Mike Duffy and Neil Harl from Iowa State have promoted as the most efficient for Iowa agriculture through the 80's and 90's. The Practical Farmers of Iowa organization that I have been involved with for 27 years helps provide the on-farm research tools to keep finding the answers to the tough questions farmers keep asking. The "heroin high" of products like Roundup and Bt have helped move to the inevitable trend toward ever larger farms that are capital and technology rich but people and species poor; a sort of plantation style agriculture that is growing worldwide. Most rural areas and communities continue to lose population, especially young people because of the lack of diversified economic opportunities. School districts keep getting larger. The question of who will take over the farming business when my generation retires remains unanswered.

I can speak personally to the statement of being species-poor. We can count over 25 species of birds on any given day on our farm. On biotechnology monoculture farms of corn and soybeans, I see virtually no birds or signs of any wildlife other than the growing crops. I have only seen one pair of pheasants this entire fall. I suspect that the huge drop in numbers is due to more than loss of habitat and climate change. What the pheasants are eating might be playing a role as well. It needs to be studied. We are losing a majestic bird, and that is having a huge recreational and economic impact.

Fred Kirschenmann, distinguished fellow, Leopold Center for Sustainable Agriculture, wrote an article "What really drives science?" for the Fall 2013 newsletter. He references a book: Ignorance- How It Drives Science written by Stuart Firestein, Department of Biology chair at Columbia University. (Firestein-2012) In this book Firestein suggests our current view of science is that it churns out the cold hard facts with indisputable certainty. Firestein argues this is not how science really works. Science is actually driven by what "is not known", not by what "is known". It is a process where new things are continually being discovered. He calls them "black cats in a dark room." Kirchenmann says: *"When the agricultural sciences discovered that pest pressures in monocultures could be addressed by inventing and applying pesticides, we assumed sound science had solved the problem. Instead, we should have used that moment to investigate the other black cats in the room: What if pests become resistant to pesticides? What if the pesticides get into our food and water? What if the pesticides affect soil microorganisms, and what impact could they have on soil biology? Are there other ways to address pest problems?"*

I think the Biotechnology industry has been trying to use the "sound science" definition to defend their way of doing business with gene trait insertion certainty. They are ignoring that genetics and farming is about system genetics and biology. The earlier approach that treated single genes as determinants of all physical beings has largely been replaced by a more dynamic process in which genes are constantly turned on and off as they interact with the environment. (Noble 2006) This suggests the need to be more careful when we think about inserting novel genes into a seed and expect that no negative consequences could occur.

Fortunately, more weed scientists are openly questioning the reductionist, easy fix, gene-insertion technologies behind today's herbicide-tolerant cropping systems. Six respected,

academic weed scientists wrote in a 2012 article in the Journal of Weed Science: *“More research on herbicide alternatives is required. Research on allelochemicals, bio-fumigants, diverse crop rotations, higher seeding rates, intercropping, competitive cultivars and planting patterns, physical weed control, weed seed destruction, and reducing weed seed and vegetative promogule dormancy is crucial for a sustainable future.”* (Harker et.al)

Let us remember what the World Food Prize is about – honoring those that have helped advance food security for people around the world. To date, the tools of molecular biology have mostly been directed toward corn, cotton, and soybeans; industrial crops mostly fed to livestock, or used to make food oils, sugar, or biofuels. In the “Statement of Achievement” accompanying this award, it is claimed biotechnology has increased yields, promoted food security, and reduced pesticide use. I wish these claims were universally true, but they are clearly not.

It requires about 10 calories of food energy from corn and soybeans to produce one calorie’s worth of the beef or dairy products which people consume. The conversion is a little more efficient in the case of swine and poultry, but Iowa could feed many more people by growing a variety of fruits, nuts, grains and vegetables rather than strictly corn and soybeans. Additionally, over 40% of our corn grown nationwide is used to make ethanol. It is hard to argue that diverting corn and soybeans to biofuels promotes food security.

I have had the privilege of doing some agricultural work in Honduras where one of our sons was a Peace Corps volunteer. I could see first-hand there what farmers needed more was not GMO seeds, but instead help in adopting the same low-cost, renewable and integrated farming principles that sustainable agriculture uses, adapted of course to their soils, crops, infrastructure and culture.

My final advice is to focus less on the laboratory genetics and gene insertion, but instead pursue time-tested and proven integrated biological approaches in agriculture. There is no silver bullet.

Bibliography:

1. Science Magazine- Sept. 2013, “What happens when weed killers stop killing” by Robert Service.
2. Scientific American, “Do seed companies control GM crop research?” August, 2009
3. Chuck Benbrook-Environmental Sciences Europe-2012 24: 24
4. USDA Pesticide Data Program (PDP) 2010- Pesticide Use and Dietary Risk on Crops surveyed by USDA, NASS and PDP
5. Fred Kirschenmann, Leopold Center for Sustainable Agriculture, Fall 2013 Newsletter
6. Stuart Firestein, Ignorance, How It Drives Science-2012, Oxford University Press
7. Denis Noble-2006, Dept. of Physiology, Anatomy and Genetics, Oxford University, UK
8. Weed Science 2012- 60:143-144